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PS - 120/64
17 April 1964

MEMORANDUM FOR: Chief, CIA/PID (NPIC)
FROM : Chief, Production Staff
SUBJECT : Trip Report

1. On 10 April 1964, I accompanied [redacted] on an inspection trip [redacted]. The purpose of the trip was to view the nearly-completed prototype unit of the [redacted] Chip Comparator and evaluate its potential as a unit to be used by PID analysts in conjunction with the [redacted] as an on-line mensuration system.

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2. The essentials of the comparator are as follows:

a. Format size is approximately $4\frac{1}{2}$ " by $4\frac{1}{2}$ ". It may be made exactly $4\frac{1}{2}$ " by slight modifications to the base.

b. Minimum measurement resolution of $\pm \frac{1}{4}$ micron. The absolute accuracy will probably be better than ± 2 microns.

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c. The measurement is made on only one of the two stages. The other stage is moveable to allow stereo positioning of the image.

d. The measurement technique is the [redacted] interferometer.

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e. The film hold-down is a vacuum system. This eliminates the need for a glass cover plate with its attendant problems.

f. The illumination of each stage is individually controlled. Both overall illumination of the entire stage and spot illumination of the area viewed by the microscope are provided.

g. The entire unit is mounted in a specially designed desk unit which is separated from the measuring engine to minimize vibration and distortion of the carriages by the operator.

Declass Review by NIMA / DoD

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GROUP 1
Excluded from automatic
downgrading and
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h. The communications console for entering information into [] and receiving back measurement data is incorporated as a separate unit.

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i. The microstereoscope incorporated into the present system [] This unit has been evaluated by P&DS and PID and is being purchased separately at the present time for independent use due to its extremely high resolution characteristics.

3. At the time of the visit the comparator was in the final stages of construction and alignment. A collimator was attached to the device for our inspection of the alignment of the perpendicularity of the ways. These proved to be perpendicular within .6 seconds of arc. Resolution targets were placed on the glass stages and the motions of the fast and slow drive wheels evaluated. The motions were of extremely high quality and allowed the operator to position the image for measuring to the desired degree of precision. There was no detectable backlash or creep in the system. A suggestion was made for motorizing the last drive wheel on future systems for operator convenience. Warning buzzers were also suggested to inform the operator as he approached the end of travel on the ways.

4. It is my opinion that this device is one of the finest examples of precision machinery that has ever been devised for use by the photo analysts. All aspects of the construction show evidence of the competence and integrity of the contractor and the foresight and technical skill of the contract monitors from P&DS. The only probable limitations of the device lie in those areas which may be replaced or modified without change to the basic concept. For example, the placement of the reticle in the eyepiece is inferior to mounting it in the optical train within the body of the microscope. However, this can be changed at a later date. The question of whether or not to measure with only one reticle in one optical train or to mount reticles in both trains, still is open to investigation. This also can be incorporated into the microscope without changing the basic device. It might be decided on the basis of future developments to replace the entire [] system with another microscope-a relatively simple modification. Likewise, the interferometric measuring system is an integral unit which can be changed or replaced without affecting the measuring carriages should a superior system be found at a later date.

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5. Based on these considerations, and on the excellent quality observed on the prototype instrument at the manufacturers facility, it is strongly recommended that PID initiate purchase action for a production model of this instrument at this time. As shown by the present crude on-line system using the [] microscope and the [] unit, such a mensuration capability will fill a definite need of PID analysts. The [] Chip Comparator will provide highly accurate measurements as well as automating the inputs of the measuring process to the computer. It is also recommended that PID request P&DS to place the present prototype unit in PID when it is delivered for evaluation next month. The experience gained by the Production Staff in working with this instrument in an on-line situation will allow the maximum possible feedback to P&DS in incorporating changes to the production model.

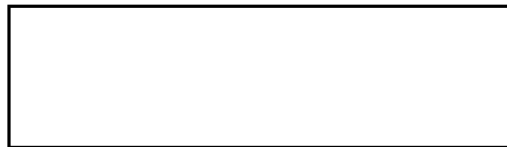
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In addition, the Production Staff has the personnel to provide training in the use of the device similar to that being given on the current [redacted] system and would be able to produce self-instructional materials, if desired, for other users in the Center. Finally, the comparator would be a valuable device for use in the psychometric scaling measurements experiments currently being undertaken [redacted] with the assistance of the Chief, Production Staff. The comparator would be placed in a PID instrument room and would be available to all components of the Center for their investigation and experimentation.

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